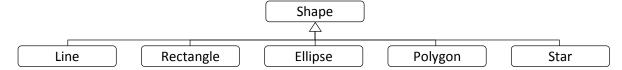
## Description

Create a JavaScript file named shapes.js that implements several Shape object constructor functions. The constructor functions should set up the following object hierarchy.



Shape initializes object properties that hold graphic styles for the specific shape object and sets them to appropriate default values. Shape also implements a draw(...) method that uses these properties to implement the <u>common tasks</u> performed when drawing a shape. The draw(...) method should be inherited by all Shape subclasses.

Shape subclasses perform the tasks unique to a particular shape to be drawn, namely to create the path corresponding to the shape given its particular parameters. All Shape subclasses should implement a method called trace(...) that creates the path outlining the Shape subclass. The trace(...) method will be invoked as the first step of the Shape draw(...) method before setting styles and filling and/or stroking the shape.

The following table details all object properties to be implemented.

Object	Constructor/Property	Description
Shape	new Shape()	The Shape constructor function has no
		parameters. It initializes the fillStyle,
		strokeStyle and lineWidth properties
		of the object to any suitable default values.
	fillStyle	Saves the fillStyle value to be used when
		drawing this shape. If set to undefined, the
		shape should not be filled.
	strokeStyle	Saves the strokeStyle to be used when
		drawing this shape. If set to undefined, the
		shape should not be stroked.
	lineWidth	Saves the lineWidth value to be used when
		drawing this shape. If set to undefined, the
		shape should not be stroked.
	draw(ctx)	Draws the shape on the 2D drawing context.
		Starts be invoking the subclass's trace (ctx)
		method to create a path. Then sets styles using
		saved properties, and fills and/or strokes the
		shape.
Line	new Line(x1, y1, x2, y2)	The Line constructor function initializes
		properties that define the first point (x1, y1)
		and last point ( $x2$ , $x2$ ) of the line.
	trace(ctx)	Creates the line path on the 2D drawing
		context (ctx)
Rectangle	new Rectangle(x, y, w, h)	The Rectangle constructor function initializes
		the upper left corner (x, $y$ ), width (w) and
		height (h) of the rectangle.
	trace(ctx)	Creates the rectangle path on the 2D drawing
		context (ctx)

Ellipse	new Ellipse(cx, cy, rx, ry)	The Ellipse constructor function initializes the
		center point (cx, cy), x-radius (rx), and y-
		radius (ry) of the ellipse.
	trace(ctx)	Creates the ellipse path on the 2D drawing
		context (ctx) using an arc.
Polygon	function(cx, cy, radius, npoints)	The Polygon constructor function initializes the
		center point (cx, cy), radius and number of
		points (npoints) that make up the polygon.
	trace(ctx)	Creates the polygon-shaped path on the 2D
		drawing context (ctx) made up of a closed
		path of straight lines.
Star	function(cx, cy, radius, npoints)	The Star constructor function initializes the
		center point (cx, cy), radius and number of
		points (npoints) that make up the polygon.
	trace(ctx)	Creates a star-shaped path on the 2D drawing
		context (ctx) made up of a closed path of
		straight lines.

## Requirements

- 1. Implement all constructor functions as detailed in the table above.
- 2. Implement all object properties and additional functions as detailed in the table above.
- 3. Implement the inheritance hierarchy as depicted in the diagram.
- 4. Note that when fillStyle is set to undefined, the shape should not be filled. When either strokeStyle or lineWidth is set to undefined, the shape should not be stroked.
- 5. Write a test program that programmatically draws a scene or abstract drawing. Your drawing must be made up of at least one instance each of Ellipse, Rectangle, and Line, and at least one instance of Polygon or Star.
- 6. You MUST enter header comments into your JavaScript file including (1) File name, (2) Your name, (3) Description and or purpose of the assignment.
- 7. You MUST comment your code, explaining what you did in each section.
- 8. Submit your HTML and/or JavaScript files using Canvas under the appropriate assignment.